

PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

To:

TRIPOLI, Joseph, S.
Thomson Multimedia Licensing
Incorporated
P.O. Box 5312
Princeton, NJ 08543
ETATS-UNIS D'AMERIQUE

Date of mailing (day/month/year)

26 July 2000 (26.07.00)

Applicant's or agent's file reference

RCA89203

IMPORTANT NOTIFICATION

International application No.

PCT/US99/22760

International filing date (day/month/year)

30 September 1999 (30.09.99)

1. The following indications appeared on record concerning:

☒ the applicant ☐ the inventor ☐ the agent ☐ the common representative

Name and Address

THOMSON CONSUMER ELECTRONICS, INC.
10330 North Meridian Street
Indianapolis, IN 46290-1024
United States of America

State of Nationality

US

State of Residence

US

Telephone No.

Facsimile No.

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☒ the person ☐ the name ☐ the address ☐ the nationality ☐ the residence

Name and Address

THOMSON LICENSING S.A.
48 Quai A. Le Gallo
F-92648 Boulogne Cedex
France

State of Nationality

FR

State of Residence

FR

Telephone No.

Facsimile No.

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

☒ the receiving Office ☐ the designated Offices concerned
☐ the International Searching Authority ☒ the elected Offices concerned
☒ the International Preliminary Examining Authority ☐ other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

R. Chrem

Facsimile No.: (41-22) 740.14.35

Telephone No.: (41-22) 338.83.38

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference RCA89203	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/US 99/ 22760	International filing date (day/month/year) 30/09/1999	(Earliest) Priority Date (day/month/year) 30/09/1998
Applicant THOMSON CONSUMER ELECTRONICS, INC. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1
☐ None of the figures.

PATENT COOPERATION TREATY

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From the INTERNATIONAL BUREAU

NOTIFICATION CONCERNING
SUBMISSION OR TRANSMITTAL
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

To:

TRIPOLI, Joseph, S.
Thomson Multimedia Licensing
Incorporated
P.O. Box 5312
Princeton, NJ 08543
ETATS-UNIS D'AMERIQUE

Date of mailing (day/month/year) 21 January 2002 (21.01.02)	
Applicant's or agent's file reference RCA89203	IMPORTANT NOTIFICATION
International application No. PCT/US99/22760	International filing date (day/month/year) 30 September 1999 (30.09.99)
International publication date (day/month/year) 06 April 2000 (06.04.00)	Priority date (day/month/year) 30 September 1998 (30.09.98)
Applicant THOMSON LICENSING S.A. et al	

- The applicant is hereby notified of the date of receipt (except where the letters "NR" appear in the right-hand column) by the International Bureau of the priority document(s) relating to the earlier application(s) indicated below. Unless otherwise indicated by an asterisk appearing next to a date of receipt, or by the letters "NR", in the right-hand column, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).
- This updates and replaces any previously issued notification concerning submission or transmittal of priority documents.
- An asterisk(*) appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b). In such a case, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.
- The letters "NR" appearing in the right-hand column denote a priority document which was not received by the International Bureau or which the applicant did not request the receiving Office to prepare and transmit to the International Bureau, as provided by Rule 17.1(a) or (b), respectively. In such a case, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

<u>Priority date</u>	<u>Priority application No.</u>	<u>Country or regional Office or PCT receiving Office</u>	<u>Date of receipt of priority document</u>
30 Sept 1998 (30.09.98)	60/102,429	US	20 Sept 2001 (20.09.01)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer

David MALEK

Telephone No. (41-22) 338.83.38

PATENT COOPERATION TREATY

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US

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JUL 17 2000

IS&S

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From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

Tripoli, J.S.
THOMSON MULTIMEDIA LICENSING INC.
P.O. Box 5312
Princeton, New Jersey 08543
ETATS-UNIS D'AMERIQUE

RDC HC

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT
(PCT Rule 71.1)Date of mailing
(day/month/year) 07.07.2000Applicant's or agent's file reference
RCA89203

IMPORTANT NOTIFICATION

International application No.
PCT/US99/22760International filing date (day/month/year)
30/09/1999Priority date (day/month/year)
30/09/1998Applicant
THOMSON LICENSING S.A.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/



European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized officer

SCHALINATUS, D

Tel. +49 89 2399-8242



PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference RCA89203	FOR FURTHER ACTION		See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/US99/22760	International filing date (day/month/year) 30/09/1999	Priority date (day/month/year) 30/09/1998	
International Patent Classification (IPC) or national classification and IPC H04N5/52			
Applicant THOMSON LICENSING S.A.			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 4 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 01/05/2000	Date of completion of this report 07.07.2000
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Noll, B Telephone No. +49 89 2399 8700 <div style="text-align: right;">  </div>

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/US99/22760

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-9 as originally filed

Claims, No.:

1-12 as originally filed

Drawings, sheets:

1/6-6/6 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/US99/22760

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-12
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-12
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-12
	No:	Claims	

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/US99/22760

To section V:

The invention according to claim 1 relates to an apparatus for aligning signals in a tv receiver. A mute and a video level circuit, both coupled to a control signal source, are controlled such that a first portion of a control signal controls the mute circuit and a second portion of the control signal controls the video level circuit.

Claim 10 is directed to a corresponding method.

None of the available prior art discloses or renders obvious the subject-matter claimed. The document EP-A-0 567 343 cited in the search report only mentions that the duty ratio between a first and a second control signal portion is changed in order to adjust brightness and contrast.

Dependent claims 2-9, 11 and 12 relate to preferred embodiments of the invention. Hence claims 1-12 meet the requirements of Article 33(2)-(4) PCT.

To section VII:

Reference signs in parentheses should have been inserted in the claims to increase their intelligibility, Rule 6.2(b) PCT. This applies to both the preamble and characterising portion.

To meet the requirements of Rule 5.1(a)(ii) PCT, the document mentioned above should have been identified in the description and the relevant background art disclosed therein should have been briefly discussed.

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference RCA89203	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/US99/22760	International filing date (day/month/year) 30/09/1999	Priority date (day/month/year) 30/09/1998
International Patent Classification (IPC) or national classification and IPC H04N5/52		
Applicant THOMSON LICENSING S.A.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 4 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

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- II ☐ Priority
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- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 01/05/2000	Date of completion of this report 07.07.2000
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Noll, B Telephone No. +49 89 2399 8700 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/US99/22760

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-9 as originally filed

Claims, No.:

1-12 as originally filed

Drawings, sheets:

1/6-6/6 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/US99/22760

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims 1-12
	No: Claims
Inventive step (IS)	Yes: Claims 1-12
	No: Claims
Industrial applicability (IA)	Yes: Claims 1-12
	No: Claims

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/US99/22760

To section V:

The invention according to claim 1 relates to an apparatus for aligning signals in a tv receiver. A mute and a video level circuit, both coupled to a control signal source, are controlled such that a first portion of a control signal controls the mute circuit and a second portion of the control signal controls the video level circuit.

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None of the available prior art discloses or renders obvious the subject-matter claimed. The document EP-A-0 567 343 cited in the search report only mentions that the duty ratio between a first and a second control signal portion is changed in order to adjust brightness and contrast.

Dependent claims 2-9, 11 and 12 relate to preferred embodiments of the invention. Hence claims 1-12 meet the requirements of Article 33(2)-(4) PCT.

To section VII:

Reference signs in parentheses should have been inserted in the claims to increase their intelligibility, Rule 6.2(b) PCT. This applies to both the preamble and characterising portion.

To meet the requirements of Rule 5.1(a)(ii) PCT, the document mentioned above should have been identified in the description and the relevant background art disclosed therein should have been briefly discussed.

CT/US 99/22760

1

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/22760

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>YAMAMOTO Y. ET AL: "A NEW VIDEO PROCESSOR FOR COLOR TV" IEEE TRANSACTIONS ON CONSUMER ELECTRONICS., vol. 343, no. 3, 1 August 1988 (1988-08-01), pages 443-450, XP000002720 IEEE INC. NEW YORK., US ISSN: 0098-3063 the whole document -----</p>	1-4,7,10

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

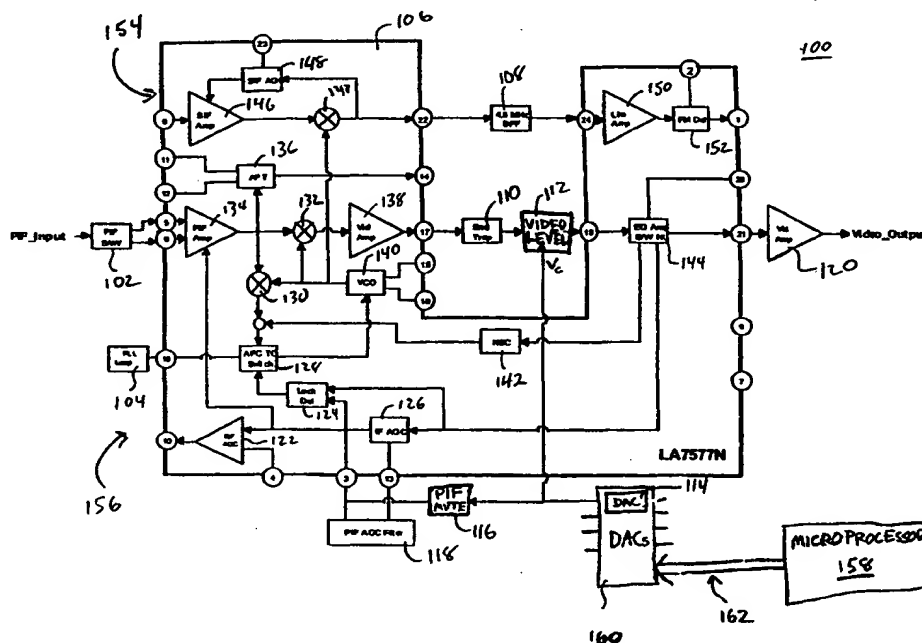
PCT/US 99/22760

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4434439	A	28-02-1984	AT 386916 B	10-11-1988
			AT 60183 A	15-03-1988
			AU 567489 B	26-11-1987
			AU 1142583 A	01-09-1983
			BE 895964 A	16-06-1983
			CA 1195770 A	22-10-1985
			CS 268511 B	14-03-1990
			DD 207796 A	14-03-1984
			DE 3305919 A	01-09-1983
			DK 74583 A,B,	23-08-1983
			ES 519798 A	16-05-1984
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			GB 2115629 A,B	07-09-1983
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			IT 1168763 B	20-05-1987
			JP 1812878 C	27-12-1993
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			NZ 203346 A	14-03-1986
			PT 76177 A,B	01-03-1983
			SE 452837 B	14-12-1987
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			SU 1321384 A	30-06-1987
			YU 36683 A	30-04-1986
			ZA 8301144 A	25-04-1984
EP 567343	A	27-10-1993	JP 2918388 B	12-07-1999
			JP 5304430 A	16-11-1993
			US 5448288 A	05-09-1995
			CA 2094769 A,C	25-10-1993
			CN 1078837 A	24-11-1993
US 4706108	A	10-11-1987	JP 2054137 C	23-05-1996
			JP 7089673 B	27-09-1995
			JP 61237589 A	22-10-1986
			JP 61237588 A	22-10-1986
			AT 86424 T	15-03-1993
			CA 1282858 A	09-04-1991
			DE 3687849 A	08-04-1993
			EP 0198692 A	22-10-1986
US 5124980	A	23-06-1992	NONE	

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : H04N 5/52, 17/04, 5/44	A1	(11) International Publication Number: WO 00/19717
		(43) International Publication Date: 6 April 2000 (06.04.00)
(21) International Application Number: PCT/US99/22760		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
(22) International Filing Date: 30 September 1999 (30.09.99)		
(30) Priority Data: 60/102,429 30 September 1998 (30.09.98) US		
(71) Applicant (for all designated States except US): THOMSON CONSUMER ELECTRONICS, INC. [US/US]; 10330 North Meridian Street, Indianapolis, IN 46290-1024 (US).		
(72) Inventor; and (75) Inventor/Applicant (for US only): HUTCHINSON, Daniel, Mark [US/US]; 13790 Laredo Drive, Carmel, IN 46032 (US).		
(74) Agents: TRIPOLI, Joseph, S. et al.; Thomson Multimedia Licensing Incorporated, P.O. Box 5312, Princeton, NJ 08543 (US).		Published <i>With international search report.</i>

(54) Title: APPARATUS FOR PROVIDING TELEVISION RECEIVER ALIGNMENT FUNCTIONS



(57) Abstract

A method and apparatus within a television receiver for electronically aligning signals within the receiver by controlling support circuitry for an IF module. A control voltage source (DAC 114) controls both video alignment and picture IF (PIF) mute functions. The DAC is coupled to a video level control circuit (112) within the video amplifier circuitry of the television receiver. The control signal controls both the video level as well as a PIF mute circuit (116).

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
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DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

**APPARATUS FOR PROVIDING TELEVISION RECEIVER ALIGNMENT
FUNCTIONS**

This application claims the benefit of U.S.
5 provisional application serial no. 60/102,429 filed
September 30, 1998, which is hereby incorporated herein by
reference.

BACKGROUND OF THE DISCLOSURE

10

1. Field of the Invention

The invention relates to television receivers and,
more particularly, the invention relates to television
receivers having a system microprocessor and a bus
15 interface that facilitate a plurality of controllable
functions for aligning the signals within the receiver.

BACKGROUND OF THE INVENTION

20

In modern television receivers, a microprocessor
provides command and control information through an I²C bus
interface to provide various control functions. The I²C
bus is coupled to a module (an IF integrated circuit)
comprising a tuner, IF, and stereo decoder. To achieve
25 the best picture and sound performance, the microprocessor
may have to control 8 or more alignment functions and
various switch functions through the I²C bus interface.
These functions provide factory alignment of various
signal characteristics such as video output amplitude and
30 DC level, RF AGC delay threshold, and the like. Such
electronic alignment is performed to ensure that a
consistent picture quality between televisions occurs in
retail show rooms; to ensure that consistent picture
equality results between inputs of a television with
35 multiple tuners or multiple auxiliary inputs; and to
maintain signal levels within dynamic range limitations of
the receiver circuitry.

There is a need in the television receiver art for an
economical solution that enables a system microprocessor

to control a plurality of functions of the receiver to achieve accurate signal alignment.

SUMMARY OF THE INVENTION

5

The present invention is a method and apparatus within a television receiver for electronically aligning signals within the receiver by controlling support circuitry for a module comprising a tuner, IF and a stereo
10 decoder. The invention uses a digital-to-analog converter (DAC) integrated circuit to control a plurality of alignment and switching functions within a television receiver. In one embodiment of the invention, a system microprocessor is coupled through an I²C bus to a DAC that
15 controls both video alignment and picture IF (PIF) mute functions. The DAC output is coupled to both a PIF mute circuit that in turn controls the IF AGC, i.e., switches the IF AGC off or on. The DAC is also coupled to a video level control circuit that controls the IF AGC gain.
20 Using a six bit control signal, the microprocessor can control both the video level as well as the PIF mute circuit.

BRIEF DESCRIPTION OF THE DRAWINGS

25

The teachings of the present invention can be readily understood by considering the following detailed description in conjunction with the accompanying drawings, in which:

30 FIG. 1 depicts a portion of a television receiver that is arranged in accordance with the present invention;

FIG. 2 depicts a schematic circuit of a PIF mute circuit;

FIG. 3 depicts a graph of the control voltage (DAC value) versus the PIF mute output;
35

FIG. 4 is a schematic diagram of the video level control circuit;

FIG. 5A is a graphical depiction of an output signal of the video level control circuit for relatively low DAC values;

FIG. 5B is a graphical depiction of an output signal of the video level control circuit for relatively high DAC values;

FIG. 6 is a graph of the control voltage (V_c) versus video output level for the circuit of FIG. 5;

FIG. 7 is a schematic diagram of a video amplifier; and

FIG. 8 is a graph of the control voltage (DAC value) versus sync-tip level produced by the video amplifier of FIG. 7.

To facilitate understanding, identical reference numerals have been used, where possible, to designate identical elements that are common to the figures.

DETAILED DESCRIPTION

FIG. 1 depicts a block diagram of a portion 100 of a television receiver comprising a signal processing module 106 as well as components of the present invention that support the operation of the module. The signal processing module 106 is, for example, a model LA7577N module manufactured by Sanyo Corporation. The module 106 comprises an IF circuitry for both sound (SIF) and picture (PIF). The audio circuitry portion 154 of the module 106 comprises an SIF amplifier 146 and SIF AGC 148, down converter 147 (mixer), a limiting amplifier 150 and an FM detector 152. Supporting the audio circuitry 154 is a 4.5 MHz bandpass filter 108. The audio circuitry 154, although it is a part of the television receiver module 106, forms no part of the present invention.

The video portion 156 of the module 106 comprises a PIF amplifier 134, a video detector 132, a phase detector 130, a voltage controlled oscillator (VCO) 140, an internal video amplifier 138, an equalization amplifier 144, an Nyquist slope canceller 142, an APC switch 128, a

lock detector 124, and IF AGC circuit 126 and an RF AGC amplifier 122. Supporting the video portion 156 of the module 106 is a PIF saw filter 102, a phase lock loop filter 104, a PIF AGC filter 118 and an external video amplifier 120 at the output of the module 106, as well as a sound trap 110 and a video level circuit 112. The IF video input is coupled to the PIF SAW filter 102 that filters the video signal. The SAW filtered video is amplified in IF amplifier 134, then down converted to baseband using the mixer 132. The mixer 132 is driven by the voltage controlled oscillator (VCO) 140. The baseband video is amplified by internal video amplifier 138. The amplified signal is filtered by the sound trap 110 and applied to the input of the video level control circuit 112. The operation of the video level control circuit 112 affects the IF AGC 126 which in affects the gain of the PIF Amp 134 and, thus, the video signal amplitude. The output of the video level control circuit 112 is applied to the equalization amplifier 144. The output of the equalization amplifier 144 is further amplified by video amplifier 120 to form the video output signal. The output of the PIF AGC filter is coupled to the lock detector 124 that drives the APC switch 128. The APC switch 128 selects the mode of operation for the PLL loop filter, i.e., whether the filter is operated in broad band mode (used during signal acquisition) or narrow band mode (used after PLL lock). The system microprocessor 158 couples digital control signals to DAC 114 that, in turn, controls the operation of both the level circuit 112 and the PIF mute 116.

It is important to note that the video level circuit is within the IF AGC loop and the IF amplifier gain is set by detecting the sync-tip level. As such, a change in the DC level of the video signal, as performed by the level circuit 112, changes the sync-tip level and the IF AGC loop gain. Consequently, a change in DC level controls the amplitude of the video signal.

The invention supports the module 106 through video level circuit 112 and PIF mute circuit 116, and an integrated circuit 160 containing a plurality (eight) digital-to-analog converters. In accordance with the present invention, a
5 single DAC 114 within the integrated circuit 160 is used to control both the video level control circuit 112 and the PIF mute circuit 116. The DACs 160 are controlled by the system microprocessor 158 via the system I²C serial bus 162.

The specific interconnections shown in FIG. 1 are
10 representative of the interconnections within the LA7577N module 106. Those skilled in the art will realize that the inventive use of a digital-to-analog converter for controlling both the video alignment and the PIF mute functions could be used with many other arrangements of
15 PIF circuitry. Similarly, the inventive video amplifier 120 and video level circuit 112 described below could be used in many other video processing applications.

The DAC 114 operates using 6 bits of input digital information to provide a variable analog output which is
20 used to control both the PIF mute circuit 116 and the video level circuit 112. Alternatively, the DAC output, or the output of another DAC or other control voltage source, can be used to control the external video amplifier 120 (described below with respect to FIGS. 7 and
25 8). With respect to the invention, the system microprocessor, the I²C bus and DAC or DACs collectively form a control voltage source or sources (collectively identified as reference number 160).

A DAC 114 that fulfills the functions of the present
30 invention is a TDA 8444 manufactured by Phillips Corporation; however, other DACs and or control voltage generation circuits could be used. The output of the DAC 114 is coupled to the video level control circuit 112. This circuit is in essence a DC level shifter that sets
35 the input DC level of the video signal into the equalization amplifier 144 of the module 106. The

accuracy of this DC level into the equalization amplifier is critical for proper operation of the video processing circuits down stream from the video amplifier 120 as well as to achieve proper operation of the IF AGC circuit. In the present invention less than six bits of the digital information are used for controlling the video DC level which is sufficient for the LA7577N. More or less bits could be used for other applications as those skilled in the art would easily understand. The same output from the DAC 114 that is coupled to the video level circuit 112 is also coupled to a PIF mute circuit 116.

The PIF mute circuit 116 sets the IF amplifier gain to minimum by pulling the IF AGC control voltage to ground. This function is used in the factory and field service to align the VCO free run frequency. In television receivers with auxiliary inputs, the PIF mute circuit 116 can also be used, if necessary, to prevent cross talk from the tuner IF video signal to the selected auxiliary input signal. In the present invention, the PIF mute function also sets the tuner RF amplifier gain to minimum because the RF AGC control voltage (pin 10) of module 106 is pulled to ground when the IF AGC control voltage is pulled below the reference voltage determined by the RF AGC delay alignment. This results in more effective muting than if only the IF amplifier is set to a minimum gain.

Using the circuitry described above, a single DAC 114 can be used for two functions if the two functions are a) complimentary or b) never used at the same time, but, when used, do not interfere with one another. Complimentary functions are those that are intended to be used at the same time. The video alignment and PIF mute functions are complimentary because a) the PIF mute must be deactivated whenever the video output must be set to the proper alignment point; and b) it is the intent to minimize the video output whenever the PIF mute is active. As such, a single DAC 114 can be used to control both the PIF mute circuit 116 and the video level circuit 112.

FIG. 2 depicts a schematic diagram of the PIF mute circuit 116. The output of the DAC 114 is coupled to the base of transistor Q203. This transistor has an emitter coupled to V_{ref} through resistor R200 and the collector of transistor Q203 is coupled to ground through resistor R202. The collector is also coupled to the base of transistor Q210 which forms a common emitter circuit having the collector coupled to a power supply through resistor R204. The collector of transistor Q210 is coupled through resistor R208 and to the base of transistor Q212.

The emitter of Q208 is pulled up to the reference voltage that sets the PIF mute switch point to approximately $1 V_{BE}$ below the maximum DAC output voltage. This guarantees switch operation using less than 1 bit of DAC range, while preserving as much DAC range as possible for video DC level control. The DAC output voltage is minimum when the DAC input value is 0 and maximum when the DAC input value is 63.

FIG. 3 depicts a typical characteristic curve 300 representing operation of the PIF mute circuit 116. The horizontal axis 302 depicts the control voltage (digital DAC values ranging from 0 to 63) and the PIF mute output voltage is shown on the right axis 304. For best understanding of the invention, FIGs. 2 and 3 should be referred to simultaneously. For DAC values less than 53, transistor Q212 is off and the PIF mute output voltage is determined by the IF AGC loop. At this DAC level, the DAC only controls the video DC level (as described below). For DAC values greater than or equal to 53, transistor Q212 is on and the PIF mute output pulls the AGC control signal to ground and the video output of the module 106 is minimized. While the video output is muted, the VCO free-run frequency is adjusted and the auxiliary inputs can be tested.

FIG. 4 depicts an embodiment of a video level circuit 112 of FIG. 1. This circuit 112 can be used in a television receiver arrangement described above, where a

single DAC 114 drives both the PIF mute circuit 116 and the video level control circuit or it can be used in a more traditional setting where the video level control circuit 112 is controlled by its own control voltage

5 source.

In FIG. 4, transistors Q300 and Q302 isolate the DC level shift circuit 322 from the 4.5 Mhz soundtrap (110 in FIG. 1). Transistor Q300 is used to offset the V_{BE} drop of transistor Q302 which also minimizes temperature drift of the circuit 112. The DC voltage at the emitter of transistor Q302 is constant and the collector is coupled to ground through resistor R308. Therefore the DC level shift between Q302 emitter and the AGC detector input at pin 19 of module 106 of FIG. 1 depends on the value of R310 and the DC current determined by the current source comprising transistor Q304 and resistor R312. The current is controlled by voltage V_c , the output of a DAC, connected to R316. Capacitor C320 filters any noise that may be present at the DAC output.

20 The effectiveness of the circuit 112 is depicted in FIG. 6 wherein the control voltage (digital DAC values) are shown on the horizontal axis 600 and the video output values are shown on the left axis 602. As the DAC values increase, the video output amplitude (shown as curve 604) linearly decreases. Such an amplitude decrease occurs because the circuit 112 shifts the DC level of the video. This video level shift shifts the sync-tip level that is used to set the IF AGC gain. Consequently, the IF AGC circuit alters the gain of the IF amplifier (134 in FIG. 1). Typical factory alignment levels are superimposed upon the graph as horizontal dashed lines 6060 (upper level) and 608 (lower level). FIG. 5A depicts a video output signal from module 106 having a relatively low control voltage (less current through resistor R314) and FIG. 5B depicts a video output signal from module 106 having a relatively high control voltage (more current through resistor R314). Clearly, a change in the control voltage of the level circuit 112 effectively varies the

video signal amplitude. While the circuit shown in FIG. 4 was designed specifically for the LA7577N, the concept may be applied to other IF AGC integrated circuits where the DC level can be adjusted ahead of the AGC detector.

5 The present invention provides circuitry that facilitates television receiver signal alignment using a system microprocessor to control the alignment operation through the system I²C bus. The circuitry includes a PIF mute circuit and a video level circuit. The PIF mute
10 circuit and the video level circuit can be controlled by a single control voltage source. As such, the inventive circuitry provides additional signal alignment functionality during factory alignment and testing through the television receiver system's existing microprocessor
15 and I²C bus.

Although various embodiments which incorporate the teachings of the present invention have been shown and described in detail herein, those skilled in the art can readily devise many other varied embodiments that still
20 incorporate these teachings.

What is claimed is:

1. Apparatus for aligning signals in a television receiver comprising:
 - 5 a control signal source;
an mute circuit coupled to said control signal source; and
a video level circuit coupled to said control signal source, where a first portion of a control signal from
10 said control signal source controls said mute circuit and a second portion of said control signal controls said video level circuit.
2. The apparatus of claim 1 wherein said control signal
15 source comprises a digital-to-analog converter.
3. The apparatus of claim 2 wherein the control signal source further comprises a microprocessor coupled to said digital-to-analog converter through a bus.
20
4. The apparatus of claim 1 further comprising a gain control loop, wherein said gain of said gain control loop is controlled by said video level circuit.
- 25 5. The apparatus of claim 4 wherein said mute circuit is coupled to said gain control loop.
6. The apparatus of claim 2 wherein an input to said digital-to-analog converter has multiple bits and less
30 than one bit is used to control said mute circuit and a remaining range of the analog-to-digital converter is used to control the video level circuit.
7. The apparatus of claim 1 wherein said video level
35 circuit comprises:
 - a buffer circuit;
a DC level shifting circuit coupled to said buffer circuit.

8. The apparatus of claim 1 wherein said mute circuit, when activated, deactivates an IF AGC circuit.
- 5 9. The apparatus of claim 1 wherein said mute circuit, when activated, deactivates both an IF AGC circuit and an RF AGC circuit.
10. A method of providing signal alignment in a television receiver comprising the steps of:
providing an IF AGC loop having a level shifting circuit and an IF AGC mute circuit; and
altering the DC level of a video signal within said IF AGC loop in response to a first portion of a control
15 signal; and
deactivating said IF AGC loop in response to a second portion of said control signal.
11. The method of claim 10 further comprising the step
20 of:
generating said control signal from a multi-bit digital signal, where less than one bit is used to control said mute circuit and a remaining number of bits are used to control said level circuit.
- 25 12. The method of claim 10 wherein said deactivating step further comprises deactivating an RF AGC loop.

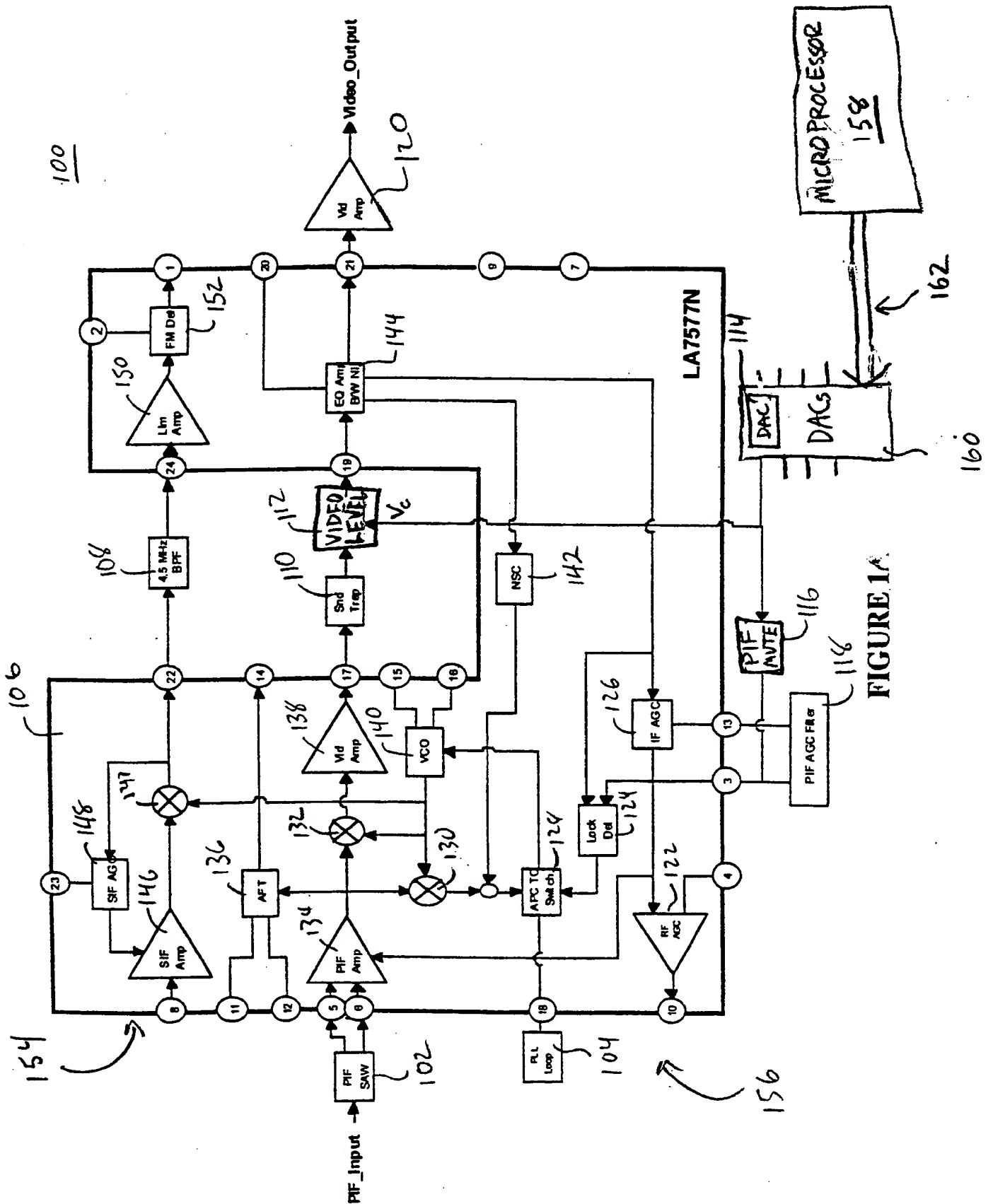


FIGURE 1A

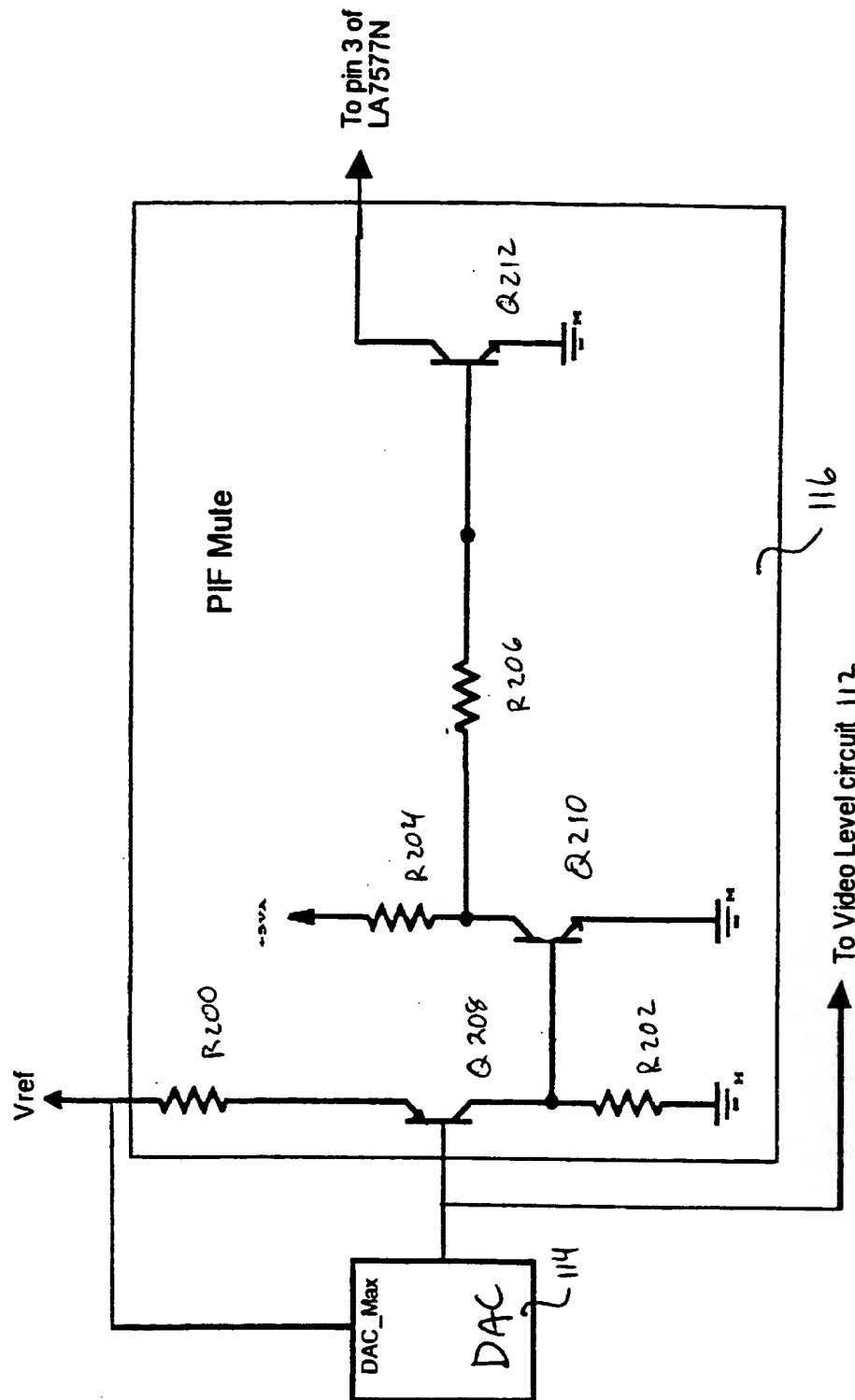


FIGURE 2

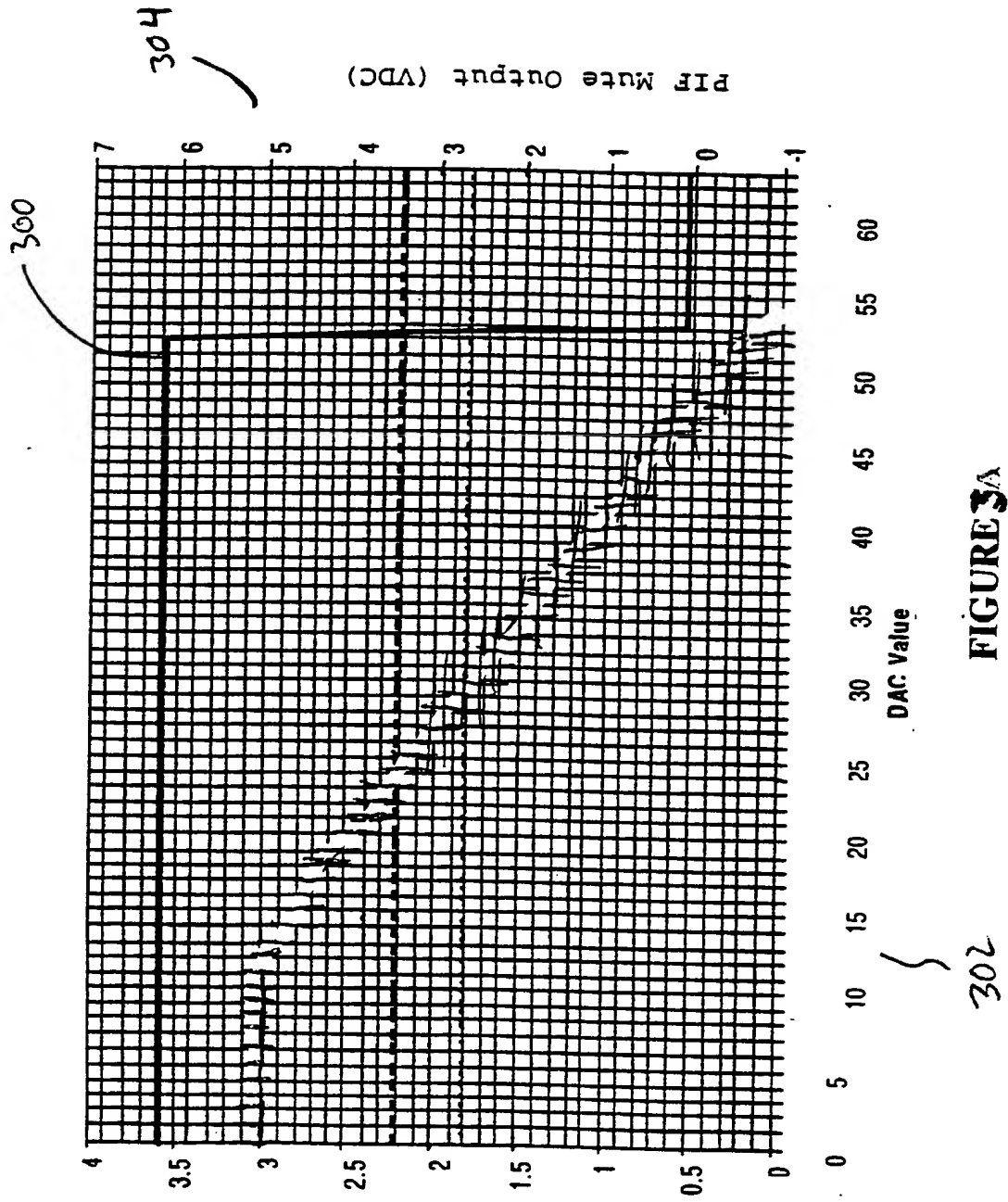


FIGURE 3A

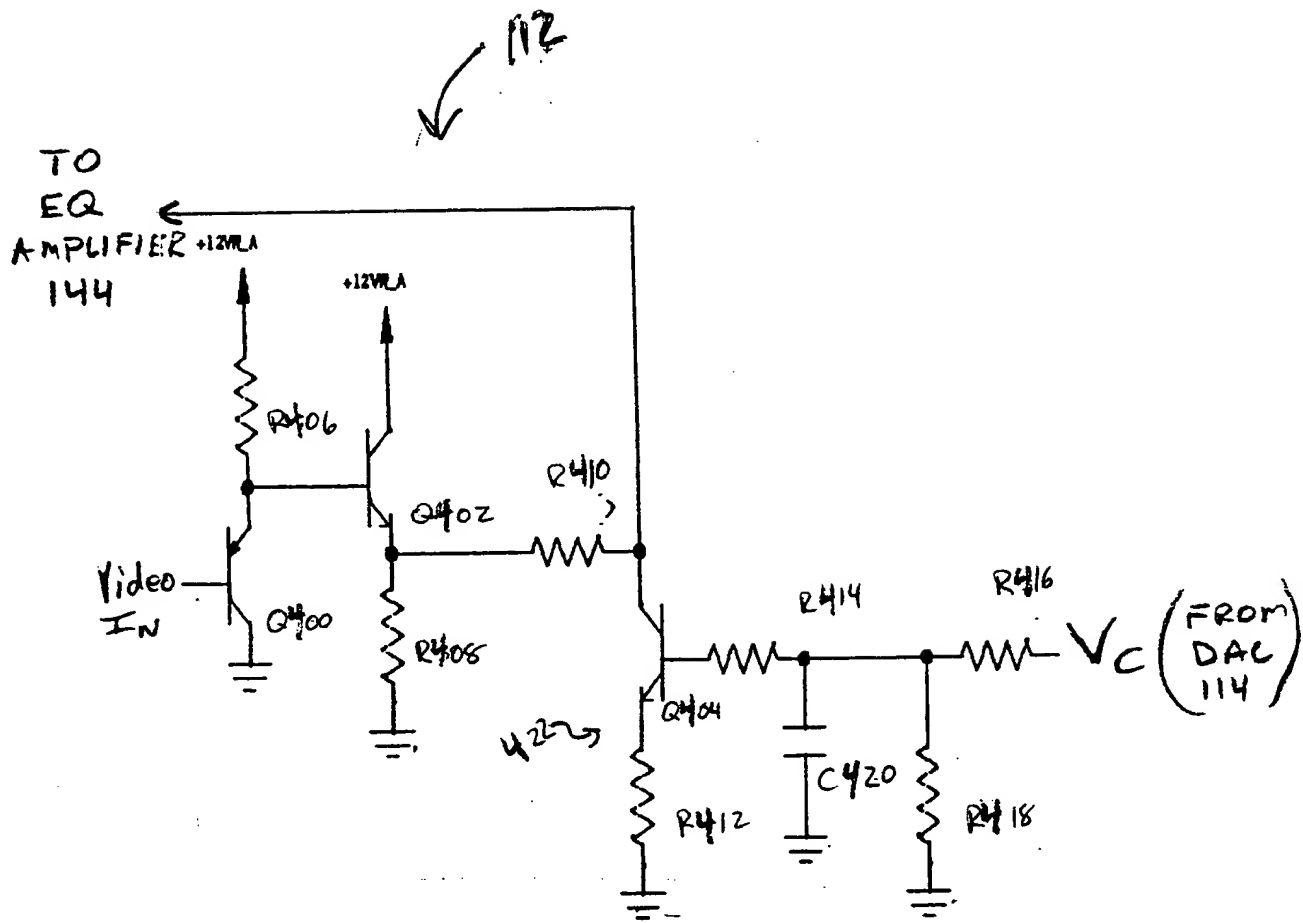


FIG. 4

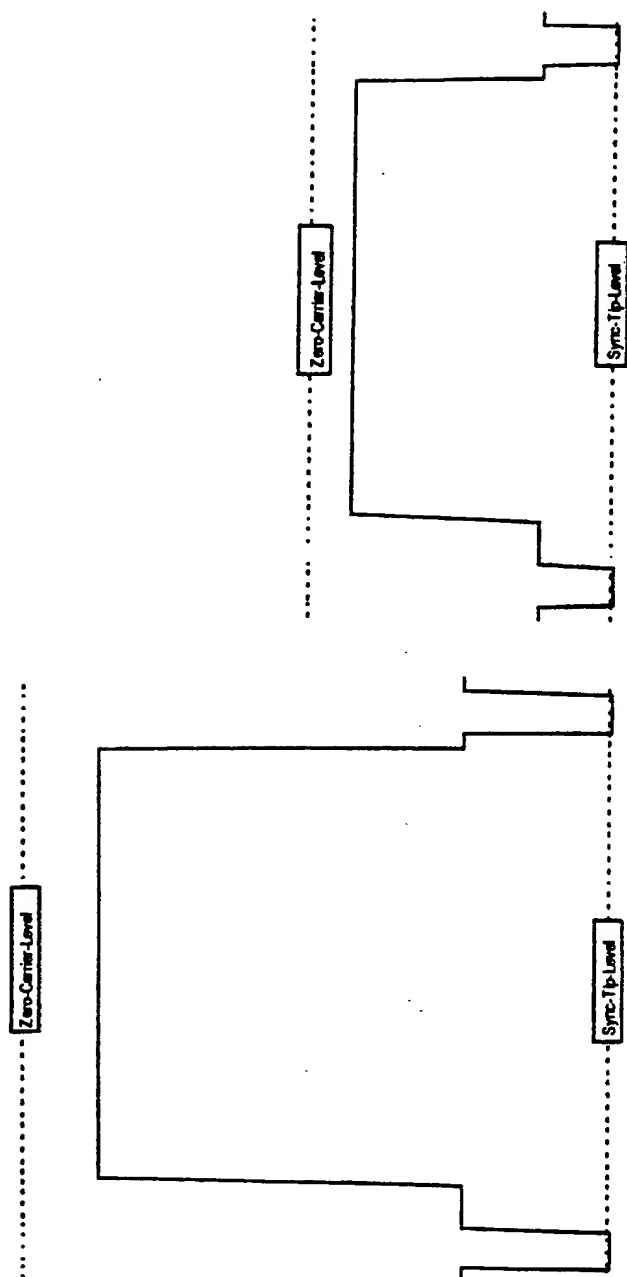


Figure 5B

Figure 5A

FIGURE 5

Video Amplitude Alignment

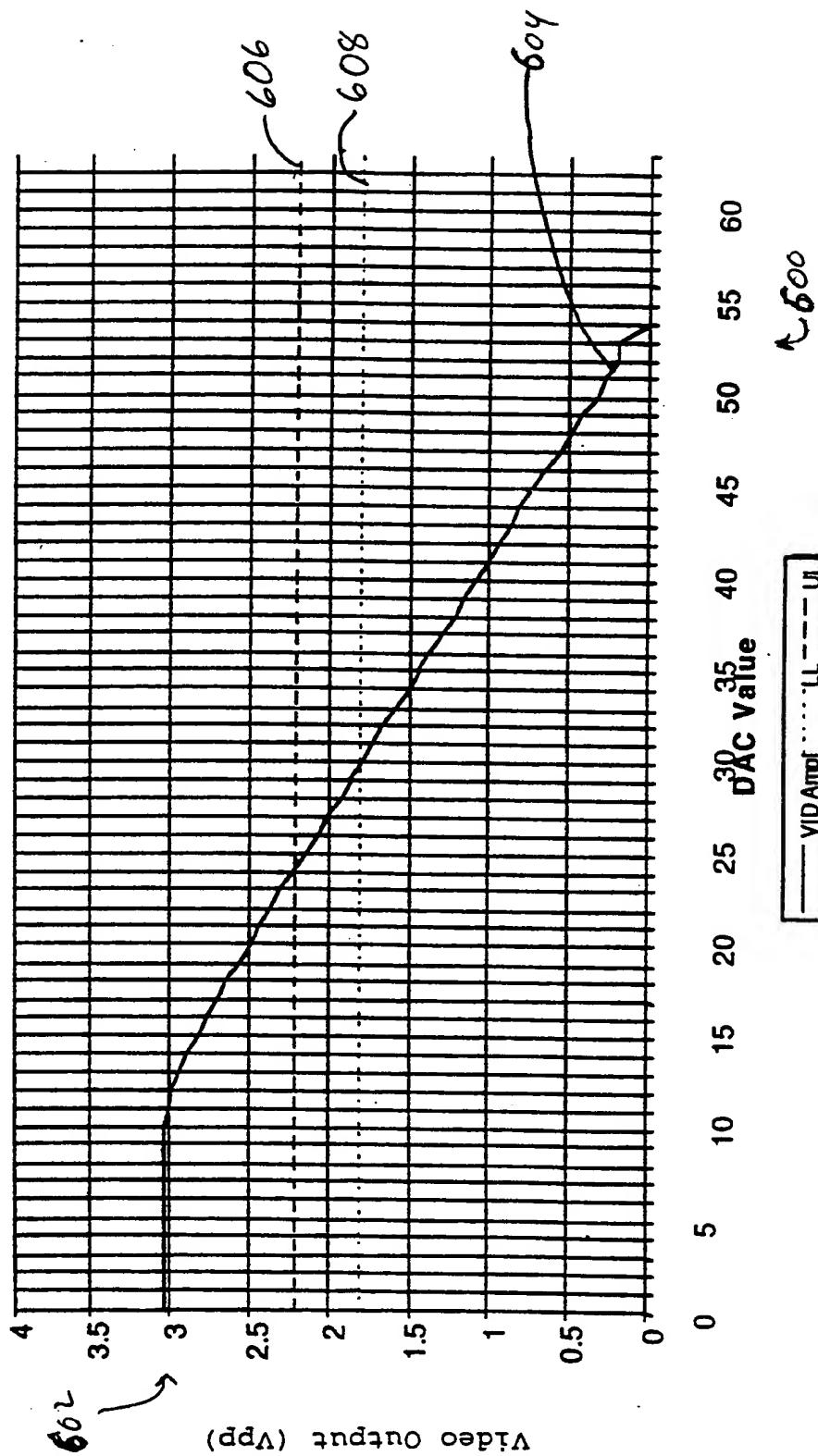


FIGURE 6

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 99/22760

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04N5/52 H04N17/04 H04N5/44

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04N

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Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
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INTERNATIONAL SEARCH REPORT

International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of the relevant passages	Relevant to claim No
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A1

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30 September 1998 (30.09.98)

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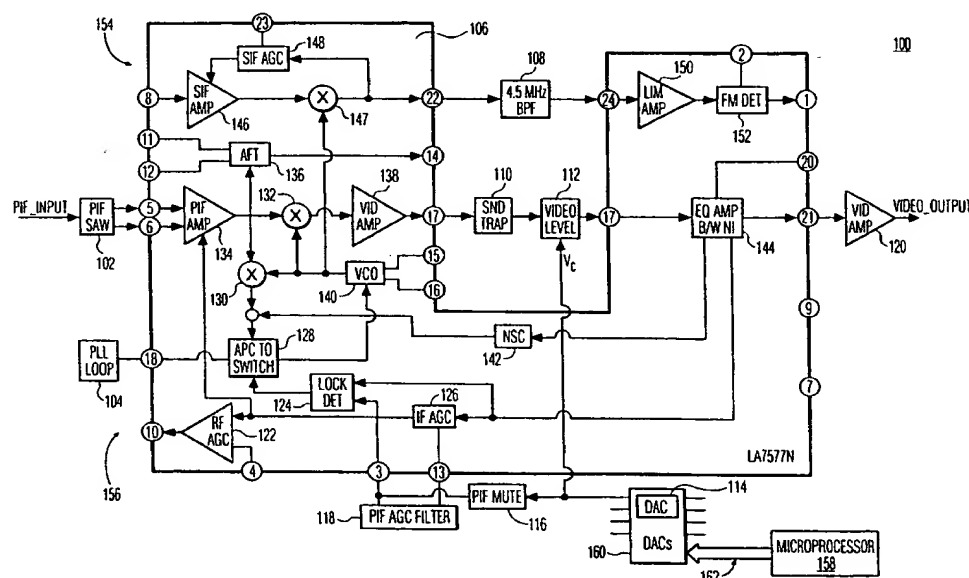
(74) Agents: TRIPOLI, Joseph, S. et al.; Thomson Multimedia Licensing Incorporated, P.O. Box 5312, Princeton, NJ 08543 (US).

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(54) Title: APPARATUS FOR PROVIDING TELEVISION RECEIVER ALIGNMENT FUNCTIONS



(57) Abstract

A method and apparatus within a television receiver for electronically aligning signals within the receiver by controlling support circuitry for an IF module. A control voltage source (DAC 114) controls both video alignment and picture IF (PIF) mute functions. The DAC is coupled to a video level control circuit (112) within the video amplifier circuitry of the television receiver. The control signal controls both the video level as well as a PIF mute circuit (116).

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INTERNATIONAL SEARCH REPORT

Inter national Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04N5/52 H04N17/04 H04N5/44

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B. FIELDS SEARCHED

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Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

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INTERNATIONAL SEARCH REPORT

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Category	Citation of document with indication, where appropriate, of the relevant passages	Relevant to claim No
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Information on patent family members

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			EP 0198692 A	22-10-1986
US 5124980	A	23-06-1992	NONE	

Box III TEXT OF THE ABSTRACT (Continuation of Item 5 of the first sheet)

Abstract is modified as follows :

Line 4: after "source" insert "(DAC 114)"

Line 5: delete "also"

Line 6: after "circuit" insert "(112)"

Line 8: after "well as" change "the" to "a"

Line 9: after "circuit" insert "(116)"

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/22760

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04N5/52 H04N17/04 H04N5/44

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 434 439 A (STECKLER) 28 February 1984 (1984-02-28) column 4, line 46 -column 6, line 56 ---	1-4,7,10
A	EP 0 567 343 A (ORION ELECTRIC CO. LTD.) 27 October 1993 (1993-10-27) page 4, line 22 -page 5, line 41 ---	1-4,10
A	US 4 706 108 A (KUMAGAI T. ET AL) 10 November 1987 (1987-11-10) the whole document ---	1-4,10
A	US 5 124 980 A (MAKI G.) 23 June 1992 (1992-06-23) column 18, line 13 - line 59 ---	1-4,10
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Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents :

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- "E" earlier document but published on or after the international filing date
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- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

14 January 2000

Date of mailing of the international search report

21/01/2000

Name and mailing address of the ISA

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Verschelden, J

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/22760

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>YAMAMOTO Y. ET AL: "A NEW VIDEO PROCESSOR FOR COLOR TV" IEEE TRANSACTIONS ON CONSUMER ELECTRONICS., vol. 343, no. 3, 1 August 1988 (1988-08-01), pages 443-450, XP000002720 IEEE INC. NEW YORK., US ISSN: 0098-3063 the whole document -----</p>	1-4,7,10

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Information on patent family members

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